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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/632,470	08/01/2003	Justin K. Brask	42P15695	3022

7590 06/04/2004

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EXAMINER

EVERHART, CARIDAD

ART UNIT	PAPER NUMBER
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2825

DATE MAILED: 06/04/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/632,470	Applicant(s) BRASK ET AL.	
	Examiner Caridad M. Everhart	Art Unit 2825	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-27 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-27 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date ____. | 6) <input type="checkbox"/> Other: ____. |

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 12, 13, 17, 21, 22, 26, and 27 are rejected under 35 U.S.C. 102(e) as being anticipated by Hobbs, et al. (US 6,300,202B1).

Hobbs discloses the steps of forming a high k dielectric layer on a substrate, forming a gate, forming spacers, reducing the dielectric material using hydrogen, and wet etching the reduced material (col. 2, lines 48-65; col. 4, lines 1-7 and 65-67; col. 5, lines 1-10). The material may comprise hafnium or zirconium (col. 2, lines 54-56). The etchant may comprise sulfuric acid and hydrogen peroxide (col. 5, lines 4-7). Fig. 2 shows that the spacers extend from the top of the gate to the upper surface of the dielectric material.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hobbs, et al. as applied to claim 12 above.

Hobbs et al is silent with respect to two gates and with respect to a trench formed . With respect to the two gates, it would have been obvious to one of ordinary skill in the art at the time of the invention that at least two gates would have been formed in the method taught by Hobbs because Hobbs teaches CMOS devices (col. 1, lines 17-21), and there are a plurality of gates formed in CMOS devices. With respect to a trench being formed, Hobbs implies that this is encompassed by the process taught by Hobbs in col. 4, lines 1-8, in which it is disclosed that for a material of titanium nitride included in the gate, formation of the spacers following the gate etch would protect the titanium nitride. This implies that when titanium nitride is not included, the spacers may be formed after the transformation and etch of the high k material, so that it would therefore have been obvious to one of ordinary skill in the art to have etched before the formation

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of the spacers, in which case a portion of the spacers would have been formed in the trench formed during the etch of the high k material.

Claims 14-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hobbs et al as applied to claim1 above, and further in view of Liou, et al. (JP2000036572, abstract only).

Hobbs is silent with respect to a plasma chamber for the reduction treatment.

Liou discloses reducing metal oxide using a hydrogen plasma, which implies a plasma chamber.

It would have been obvious to one of ordinary skill in the art at the time of the invention to have combined the plasma treatment taught by Liou with the process taught by Hobbs because both teach hydrogen reduction of metal oxides, and because the process could be carried out in known multichamber apparatus.

With respect to the flow rates and the distance from the plate, these would have been obvious to one of ordinary skill in the art because the settings of the apparatus are variables of the art which one of ordinary skill in the art would be able to determine.

Claims 18 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hobbs et al as applied to claim21 above, and further in view of Dobson, et al.(JP 2153082, abstract only).

Hobbs is silent with respect to piraha etchant.

Dobson teaches that piranha is known to etch metal from semiconductor products.

It would have been obvious to one of ordinary skill in the art at the time of the invention that piranha etchant could have been used in the process taught by Hobbs because it is a known metal etchant in the semiconductor process in view of the disclosure made by Dobson.

Claims 19 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hobbs as applied to claim 11 above, and further in view of JP54024236 (abstract only)

Hobbs is silent with respect to HCl and peroxide etchant.

The above Japanese patent teaches HCl and peroxide as a metal etchant in semiconductor processing.

It would have been obvious to one of ordinary skill in the art at the time of the invention to have used HCl and peroxide etchant because the above Japanese patent teaches that it is a known etchant of metal in semiconductor processing.

Claims 20 and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hobbs as applied to claim 11 above, and further in view of Ota et al (JP 2001213696, abstract only).

Hobbs is silent with respect to the use of SC2 etchant.

Ota teaches that SC2 is used for removing metal from semiconductor surfaces.

It would have been obvious to one of ordinary skill in the art to have used SC2 etchant in the process taught by Hobbs because Ota teaches that this is a known etchant for metal in semiconductor processing. Any inquiry concerning this communication or earlier communications from the examiner should be directed to

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Caridad M. Everhart whose telephone number is 571-272-1892. The examiner can normally be reached on Monday through Fridays 7:30-4:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew S. Smith can be reached on 571-272-1907. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

C. Everhart
5-26-2004


CARIDAD EVERHART
PRIMARY EXAMINER